ATR POWER SUPPLIES BUFFER BOARDS

There are 7 types of buffer boards in the ATR line.

This is a table that shows which type of buffer board goes with which p.s.. It is broken up by p.s. house

NW Area

Type 4	Type 5
UTV1	UQ1
UTH2	UQ2
	UQ3
	UD1-UD2 (4.25 DEGREE BEND)

A House

Type 1	Type 2	Type 3
UQ4	UTH2.1	UTH3
UQ5	UTH2.2	UTV4
UQ6		UTV5
UQ7		UTH6
UQ8		UTV7
UQ9		
UQ10		
UQ11		
UQ12		
UQ13		
UD3-UD6, (8 DEGREE BEND)		

PLEASE SEE NEXT PAGE

1000P

Type 1	Type 6	Type 7
WD1-WD8 (20 DEGREE BEND)	WTH1	SWM
WQ1	WTV2	
WQ2	WTH3	
WQ3	WTH4	
WQ4	WTH5	
WQ5	WTV6	
WQ6	YTV1	
WP1	YTV2	
WP2	YTH3	
XARC90 (X 90 DEGREE BEND)	YTH4	
YARC90 (Y 90 DEGREE BEND)	XTV1	
	XTV2	
	XTH3	
	XTH4	

1007W

TYPE 1	TYPE 6
XQ1	XTH5
XQ2	XTV6
XQ3	XTH7
XQ4	XTV8
XQ5	XTH9
XQ6	XTV10
XP1	XD31T
	XLAMT

1005EW

TYPE 1	TYPE 6
YQ1	YTH5
YQ2	YTV6
YQ3	YTH7
YQ4	YTV8
YQ5	YTH9
YQ6	YTV10
YP1	YD31T
	YLAMT

This is a table that shows the total quantity of each type of buffer board in the ATR line:

Type	Quantity to make of each type for spares
Type 1	36
Type 2	2
Type 3	5
Type 4	2
Type 5	4
Type 6	30
Type 7	1

This is the quantity of spares of each type I would like made up:

Type	Quantity to make of each type for spares
Type 1	5
Type 2	2
Type 3	2
Type 4	2
Type 5	2
Type 6	5
Type 7	2

PLEASE GO TO NEXT PAGE FOR INSTRUCTIONS ON MAKING MODIFICATIONS TO BUFFER BIARDS AND TESTING BUFFER BOARDS

Spare buffer board instructions

1) There are 20 buffer boards that can be made into spares. They are in a box I have given to Bill Anderson.
2) The first thing to do is look at schematic Type 6. All the boards should be set up like this now.
3) All the boards should be tested using schematic Type 6 and the instructions below:

Procedure for testing all boards with schematic Type 6 (see next page)

Procedure for testing all boards with schematic Type 6

1) Install jumpers E5-E6 and E7-E8 temporarily. These will be removed when this test is done. You can solder them in if you want but you must be able to remove them, without damaging the lands, when you are done with this test. Fill out a test sheet for each test done.
2) Apply a serial number to the board with permanent black marker on the back of the board.
3) Put a 1VDC signal on JB1-1 and JB1-2 according to the polarity on the print and measure the voltage at JB2-1 and JB2-2. The voltage should match the input voltage and the polarity should match the print.
4) Repeat step 2 with a 5VDC signal.
5) Put a 1VDC signal on JB1-4 and JB1-5 according to the polarity on the print and measure the voltage at JB2-4 and JB2-5. The voltage should match the input voltage and the polarity should match the print. Also measure the voltage JB3-4 and JB3-5. The output voltage should match the input voltage but I cannot remember if the voltage should be inverted or not so just record it for now and see if all of the buffer boards are the same.
6) Repeat step 3 with a 5VDC signal. You can try adjusting R4 to make the output match the input better
7) You can grab a buffer board from UD3-UD6 and measure the voltage on JB3-4 and JB3-5 and find out if it gets inverted when you have an input on it. Then you will know if the new buffer boards are correct.
8) Next apply a 1VDC signal on JB1-6 and JB1-7 according to the polarity on the print and measure the voltage at JB2-6 and JB2-7. The voltage should match the input voltage and the polarity should match the print. Also measure the voltage JB3-6 and JB3-7. The output voltage should match the input voltage but I cannot remember if the voltage should be inverted or not.
9) Repeat step 7 with a 5VDC signal. You can try adjusting R13 to make the output match the input better
10) Next apply a 1VDC signal on JB1-12 and JB1-13 according to the polarity on the print and measure the voltage at JB2-12 and JB2-13. The voltage should match the input voltage and the polarity should match the print. Also measure the voltage JB3-12 and JB3-13. The output voltage should match the input voltage but I cannot remember if the voltage should be inverted or not.
11) Repeat step 8 with a 5VDC signal. You can try adjusting R22 to make the output match the input better
12) Next apply a 1VDC signal on JB1-10 and JB1-11 according to the polarity on the print and measure the voltage at JB2-10 and JB2-11. The voltage should match the input voltage and the polarity should match the print. Also measure the voltage JB3-10 and JB3-11. The output voltage should match the input voltage but I cannot remember if the voltage should be inverted or not.
13) Repeat step 11 with a 5VDC signal. You can try adjusting R31 to make the output match the input better.

Test Sheet for Schematic Type 6

Test for board without any modifications
This would be the same as a Type 6 Board

Serial Number_____
Installed E5-E6 and E7-E8?_____yes _____no

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 1VDC			
APPLY 5VDC			

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 1VDC			
APPLY 5VDC			

D

JB1-12 to JB1-13	JB1-12 to JB1-13 Measured	JB2-12 to JB2-13 Measured	JB3-12 to JB3-13 Measured
APPLY 1VDC			
APPLY 5VDC			

E

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

When this test is completed remove the jumpers E5-E6 and E7-E8
Removed E5-E6 and E7-E8?_____yes _____no
Apply a tag saying this is now a Type 6 board. Applied Tag? _____yes _____no

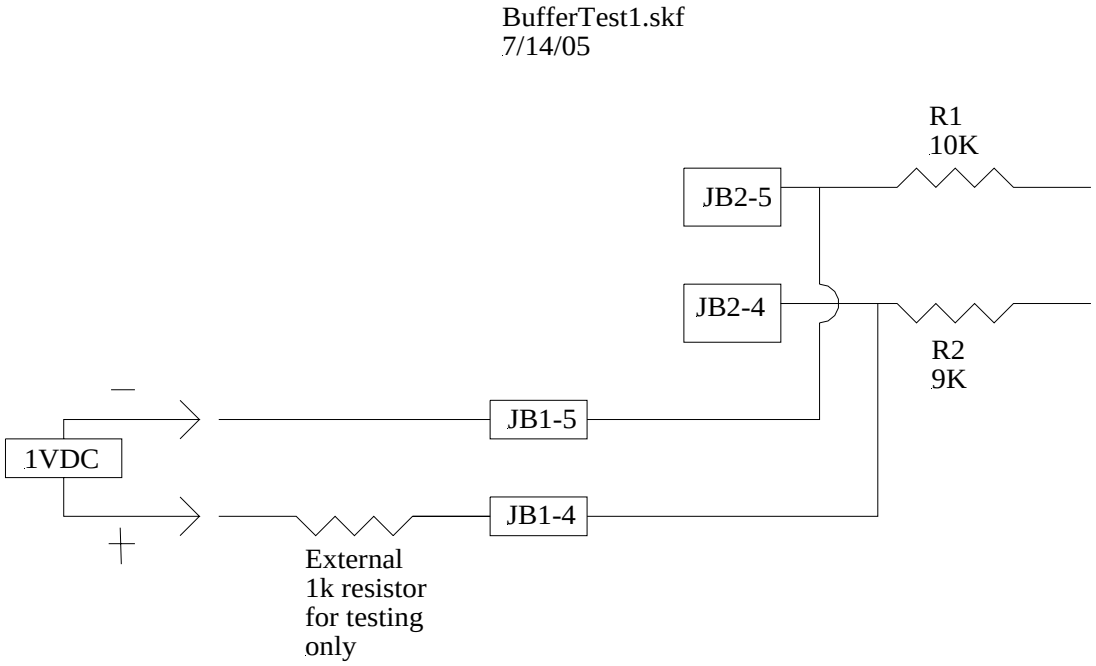
Next the modifications for each type of board will follow and then the test for each modified board will follow

Type 1 Board modifications

1) All the boards should now be labeled Type 6. Take 5 of these and make the following changes.
2) Change resistors R2, R11, R20 and R29 to 9kΩ. 0.1%. ¼ W resistors. To make 5 spares like this you will need a total of 20 of these 9kΩ. 0.1%. ¼ W resistors.
3) Make sure jumpers E5-E6 and E7-E8 are removed.
4) If you want to see an example of a board already modified this way go to the table that lists the type 1 buffer boards, find a p.s. and open it up. You can then see this buffer board modified.

See the next page for the test sheet for this Type 1 board.

Because the 9kΩ resistors are installed the input to the op-amps are not balanced. For this test use an external 1kΩ resistor in series with R2, R11 and R29 so that this is now a 10kΩ resistor again. The way you would connect your voltage is now a little different. The positive voltage goes to one end of the 1kΩ, the other end of the 1kΩ goes to JB1-4 and JB1-4 goes to R2. The negative voltage goes to JB2-5 as before. Follow this procedure for the other tests on the data sheet that follows. Remove the 1kΩ resistor when done, this is not part of the circuit, it is only for testing purposes. Here is a diagram to explain what I just said for JB1-4 and JB1-5:



Test Sheet for Schematic Type 1

Serial Number_____

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2.

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 1VDC			
APPLY 5VDC			

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 1VDC			
APPLY 5VDC			

D

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

Removed E5-E6 and E7-E8?_____yes _____no
Apply a tag saying this is now a Type 1 board. Applied Tag? _____yes _____no

Type 2 Board modifications

1) Some boards are labeled Type 6. Take 2 of these and make the following changes.
2) See the schematic labeled Schematic Type 2.
3) Install a 4.7uF capacitor from the output side of R18 to common. To modify two of these boards you will need two 4.7uF capacitors.
4) Remove R10 and R11. Look at schematic Type 2 for the modifications that have to be done to the front end of U3 after you remove R10 and R11. It is too much to put into words here but these are the parts you will need to modify 1 board. Multiply by 2 for two boards:
    a. Two 100 ohm, 0.1%, 1/4W resistors.
    b. Two 9.9kohm, 0.1%, 1/4W resistors.
    c. One 100uF, 50V, Nonpolarized capacitor. I think Pablo or Ken Wokosky may know where these are. I think they have worked with these. The capacitor has an NP marking on it.
5) Look at p.s.'s UTH2.1 or UTH2.2 in the A house for Type 2 buffer boards if you want to see the modification done already.

See the next page for the test sheet for this Type 2 board.

Test Sheet for Schematic Type 2

Serial Number_____

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2.

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 1VDC			
APPLY 5VDC			

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 1VDC			
APPLY 5VDC			

D

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

Removed E5-E6 and E7-E8?_____yes _____no
Apply a tag saying this is now a Type 2 board. Applied Tag? _____yes _____no

Type 3 Board modifications

1) Some boards are labeled Type 6. Take 2 of these and make the following changes.
2) See the schematic labeled Schematic Type 3.
3) Change R3 and R7 to 1k ohm resistors. They should be 0.1%, 1/4W. To modify 2 boards you will need 4 of these.
4) Install a 4.7uF capacitor from the output side of R18 to common. To modify two of these boards you will need two 4.7uF capacitors.
5) Install a 4.7uF capacitor for C5 and C6. To modify two of these boards you will need four 4.7uF capacitors.
6) Replace R12 with a 200Kohm resistor and then place a 22Mohm resistor in parallel with the 200k resistor. These can be 1%, 1/4W resistors. To modify two of these boards you will need two 200K resistors and 2 22mohm resistors.
7) Replace R16 with a 200Kohm, 0.1%, 1/4W resistor. To modify two of these boards you will need two 200K resistors for this mod.
8) Install a jumper across R14 and R15.
9) Change the adjustable Pot R13 from a 200 ohm adjustable pot to a 5kohm adjustable pot. To modify two of these boards you will need two of these adjustable pots.
10) Remove R10 and R11. Look at schematic Type 3 for the modifications that have to be done to the front end of U3 after you remove R10 and R11. It is too much to put into words here but these are the parts you will need to modify 1 board. Multiply by 2 for two boards:
    a. Four 100 ohm, 0.1%, 1/4W resistors.
    b. Two 1.8kohm, 0.1%, 1/4W resistors.
    c. One 100uF, 50V, Nonpolarized capacitor. I think Pablo or Ken Wokosky may know where these are. I think they have worked with these. The capacitor has an NP marking on it.
11) Look at any of the Christies in the A house if you want to see this modification made already..

See the next page for the test sheet for this Type 3 board.

Test Sheet for Schematic Type 3

Serial Number_____

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2.

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 5VDC			
APPLY 10VDC			

You should measure 0.5 V out for 5VDC in and
You should measure 1 V out for 10VDC in and

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 0.05VDC			
APPLY 0.1VDC			

You should measure 5 V out for 0.05VDC in and
You should measure 10 V out for 0.1VDC in and
You should adjust the 5K pot, R13, to make these values as close as possible to being correct.

D

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

Removed E5-E6 and E7-E8?_____yes _____no
Apply a tag saying this is now a Type 3 board. Applied Tag? _____yes _____no

Type 4 Board modifications

1) Some boards are labeled Type 6. Take 2 of these and make the following changes.
2) See the schematic labeled Schematic Type 4.
3) Change R3 and R7 to 1k ohm resistors. They should be 0.1%, 1/4W. To modify 2 boards you will need 4 of these.
4) Short out resistors R9, R18, R27 and R36.
5) Install a 4.7uF capacitor for C5 and C6. To modify two of these boards you will need four 4.7uF capacitors.
6) Replace R12 with a 200Kohm resistor and then place a 22Mohm resistor in parallel with the 200k resistor. These can be 1%, 1/4W resistors. To modify two of these boards you will need two 200K resistors and 2 22mohm resistors.
7) Replace R16 with a 200Kohm, 0.1%, 1/4W resistor. To modify two of these boards you will need two 200K resistors for this mod.
8) Install a jumper across R14 and R15.
9) Change the adjustable Pot R13 from a 200 ohm adjustable pot to a 5kohm adjustable pot. To modify two of these boards you will need two of these adjustable pots.
10) Remove R10 and R11. Look at schematic Type 4 for the modifications that have to be done to the front end of U3 after you remove R10 and R11. It is too much to put into words here but these are the parts you will need to modify 1 board. Multiply by 2 for two boards:
    d. Four 100 ohm, 0.1%, 1/4W resistors.
    e. Two 1.8kohm, 0.1%, 1/4W resistors.
    f. One 100uF, 50V, Nonpolarized capacitor. I think Pablo or Ken Wokosky may know where these are. I think they have worked with these. The capacitor has an NP marking on it.
11) Look at any of the Christies in the NW Area if you want to see this modification made already..

See the next page for the test sheet for this Type 4 board.

Test Sheet for Schematic Type 4

Serial Number_____

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2.

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 5VDC			
APPLY 10VDC			

You should measure 0.5 V out for 5VDC in and
You should measure 1 V out for 10VDC in and

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 0.05VDC			
APPLY 0.1VDC			

You should measure 5 V out for 0.05VDC in and
You should measure 10 V out for 0.1VDC in and
You should adjust the 5K pot, R13, to make these values as close as possible to being correct.

D

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

Removed E5-E6 and E7-E8?_____yes _____no
Apply a tag saying this is now a Type 4 board. Applied Tag? _____yes _____no

Type 5 Board modifications

1) Some boards are labeled Type 6. Take 2 of these and make the following changes.
2) See the schematic labeled Schematic Type 5.
3) Short out resistors R9, R18, R27 and R36.
4) Install a 4.7uF capacitor for C5 and C6. To modify two of these boards you will need four 4.7uF capacitors.
5) Install a jumper across R14 and R15.
6) Look at UQ1, UQ2, UQ3 or UD1-UD2 if you want to see this modification already made.

See the next page for the test sheet for this Type 5 board.

Test Sheet for Schematic Type 5

Serial Number_____

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 1VDC			
APPLY 5VDC			

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 1VDC			
APPLY 5VDC			

D

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

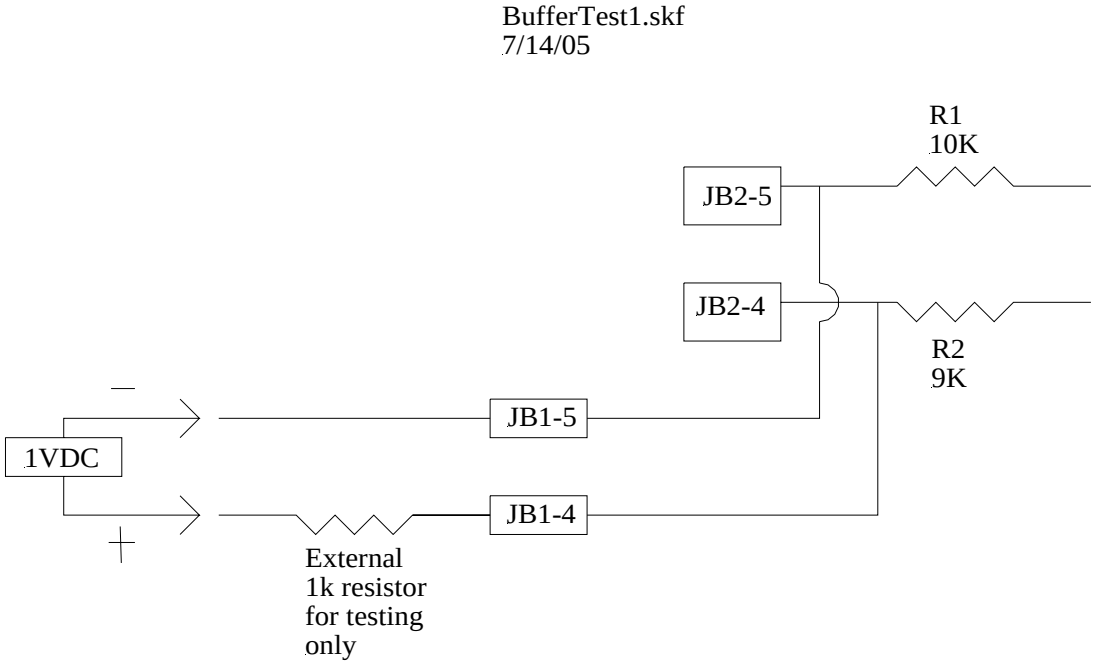
Removed E5-E6 and E7-E8?_____yes _____no
Apply a tag saying this is now a Type 5 board. Applied Tag? _____yes _____no

Type 7 Board modifications

1) Some boards should be labeled Type 6. Take 2 of these and make the following changes.
2) Change resistors R2, R11, R20 and R29 to 9kΩ. 0.1%. ¼ W resistors. To make 2 spares like this you will need a total of 8 of these 9kΩ. 0.1%. ¼ W resistors.
3) INSTALL jumpers E5-E6 and E7-E8.
4) Install jumpers across R5 and across R6.
5) For C1 install two 4.7uF capacitors in parallel. To modify 2 boards you will need two of these 4.7uF capacitors.
6) For C2 install two 4.7uF capacitors in parallel. To modify 2 boards you will need two of these 4.7uF capacitors.
7) If you want to see an example of a board already modified this way go to the SWM p.s.

See the next page for the test sheet for this Type 7 board.

Because the 9kΩ resistors are installed the input to the op-amps are not balanced. For this test use an external 1kΩ resistor in series with R2, R11 and R29 so that this is now a 10kΩ resistor again. The way you would connect your voltage is now a little different. The positive voltage goes to one end of the 1kΩ, the other end of the 1kΩ goes to JB1-4 and JB1-4 goes to R2. The negative voltage goes to JB2-5 as before. Follow this procedure for the other tests on the data sheet that follows. Remove the 1kΩ resistor when done, this is not part of the circuit, it is only for testing purposes. Here is a diagram to explain what I just said for JB1-4 and JB1-5:



Test Sheet for Schematic Type 7

Serial Number_____
Installed E5-E6 and E7-E8?_____yes _____no

Apply positive voltage to first number, for example, apply + voltage to JB1-1 and common to JB1-2. Follow this procedure for all below. The same goes for the measurement. Put the positive probe on the number that comes first, for example, below put the positive probe on JB1-1 and the negative probe on JB1-2

A

JB1-1 to JB1-2	JB1-1 to JB1-2 Measured	JB2-1 to JB2-2 Measured
APPLY 1VDC		
APPLY 5VDC		

B

JB1-4 to JB1-5	JB1-4 to JB1-5 Measured	JB2-4 to JB2-5 Measured	JB3-4 to JB3-5 Measured
APPLY 1VDC			
APPLY 5VDC			

C

JB1-6 to JB1-7	JB1-6 to JB1-7 Measured	JB2-6 to JB2-7 Measured	JB3-6 to JB3-7 Measured
APPLY 1VDC			
APPLY 5VDC			

D

JB1-12 to JB1-13	JB1-12 to JB1-13 Measured	JB2-12 to JB2-13 Measured	JB3-12 to JB3-13 Measured
APPLY 1VDC			
APPLY 5VDC			

E

JB1-10 to JB1-11	JB1-10 to JB1-11 Measured	JB2-10 to JB2-11 Measured	JB3-10 to JB3-11 Measured
APPLY 1VDC			
APPLY 5VDC			

When this test is completed leave jumpers E5-E6 and E7-E8 INSTALLED.
LEFT E5-E6 and E7-E8 INSTALLED?_____yes _____no
Apply a tag saying this is now a Type 7 board. Applied Tag? _____yes _____no